RESOURCES

Some findings and conjectures from
recent research into resource development and use

Published three times a year by RESOURCES FOR THE FUTURE, INC.

All the sciences are infinite in the extent of their researches. They do not permit of finality.—BLAISE PASCAL (1623-62)

NUMBER THREE | WASHINGTON, D. C. | FEBRUARY, 1960

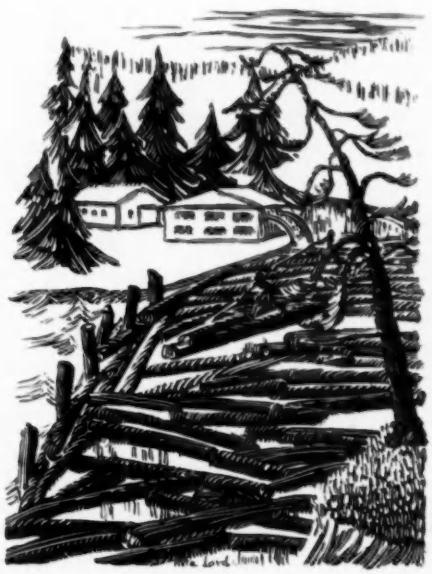
A Pine Seed Orchard and More Logs for Tomorrow

BASIC RESEARCH in forest genetics takes time. Even with faith and patience, the researcher's life might often be discouraging without occasional glimpses along the way of what the end results can be. N. T. Mirov tells of such an experience in a letter he wrote to R. G. Gustavson just before "Dr. Gus's" retirement as head of Resources for the Future. By aid of an RFF grant, Mr. Mirov since 1955 has been studying processes of flowering and seed production in pine trees at the Institute of Forest Genetics of the Pacific Southwest Forest and Range Experiment Station, located at Berkeley, California. This is part of his letter:

"WHILE IN SWEDEN last May I visited a pulp-and-paper region near Sundsvall, and I marvelled at the multimillion dollar industry based on nothing more than annual increment of pine and spruce forests of the Swedish hinterland. They have to cut not more, preferably a little less, than annual growth, lest forest resources be depleted.

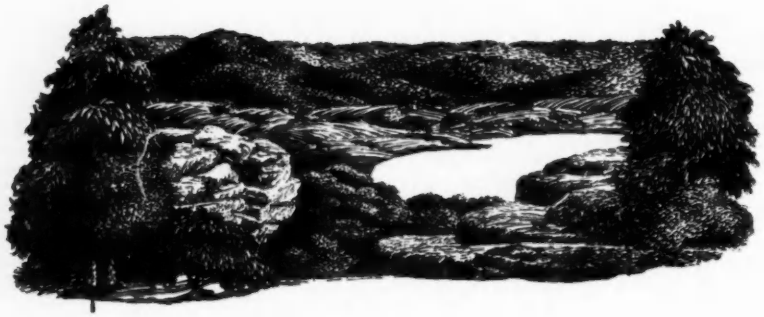
"It was a wonderful sight to see thousands of logs floated down swift rivers to the placid *sunds,* rafted, and towed to the mills and converted into various products.

"Another wonderful thing to watch was the attempts of the big concerns, such as Svenska Cellulosa A.B., to improve genetically their conifer forests. It is a slow process, but it is in actual use. Now the Svenska Cellulosa has over 300 hectares of seed orchards where better trees are nursed to their early maturity—ten years or so—and their seeds are being sent for reforestation of the cutover forest areas.



"When I sat there on the bank of the Indalsälv River, I thought that we, too, very soon will be able to supply genetically better seeds for reforestation of our land."

AS WE THINK AND ARGUE about water, land, air, energy, open spaces, and other resources separately, and I hope wisely, we can never forget that man, including urban man, must always move and live and have his being in his total environment, not separately in each of the neat cubbyholes which the experts have laid out to facilitate technical analysis.—*Luther Gulick in* PERSPECTIVES ON CONSERVATION



RESEARCH IN THE WILDERNESS

RESEARCH IS MY BUSINESS. I also like to spend time in wilderness areas. So I am predisposed to see no irreconcilable conflict between the two.

I know that many people regard research, in the social as well as the natural sciences, as an inappropriate means of getting at questions of the value of wilderness and of conditions for its preservation and use. They believe that wilderness values are essentially intangible and impossible to classify, measure, and compare with values of other uses.

I disagree with this contention, but in doing so wish first to note one exception: the value that some, perhaps many, see in having in the world wild areas in the purest sense—completely and forever unused—just for the sake of having them. There may be a psychological benefit, a sense of steadiness and attachment to earth, nature, and ecological design, which derives from a person's knowing that wilderness will persist somewhere and that he is absolutely committed to its preservation.

Despite this elusive but perhaps overriding aspect, I proceed from the premise that wilderness, like other natural resources, has little value or research interest apart from present or potential use by people. Granting that wilderness is an economic resource and has value because of use, an interesting question immediately arises: how much of what kinds of use can it have and still be wilderness? Thus, my first suggestion for intensified research on wilderness concerns how standards can be arrived at. My second suggestion is for study of supply—how much existing and potential wilderness there is—and my third for study of present and prospective demand.

The three lines of study add up to a framework for research on wilderness as a natural resource. Without such a framework that would draw together the main parts of the field and connect the whole field with the evolution and aspirations of society as a whole, the research would be narrow, barren, and frustrating. *—Joseph L. Fisher, in a paper given at the Conference on Wildland Research, October 19, 1959.*

Changing Sources Of Energy

APPEARING in October before the Joint Economic Committee's Subcommittee on Automation and Energy Resources, two RFF staff members presented statements dealing with past changes in the main energy sources of the United States, and prospective changes between now and 1975.

Bruce C. Netschert, in discussing future supplies, made use of new perspectives and concepts of his own devising, most notably a generalized over-all "resource base" and an "ultimate reserve," which concepts combine considerations of total and potential mineral stores with that of advancing technologies in mining and transit. For example:

"Many of the oil and gas discovery wells of today would have been classified as dry holes as recently as a decade or so ago. . . . since techniques for developing them did not exist.

"Similarly, some coal companies now own coal reserves that are being mined by the recently developed auger technique. A decade or more ago this same coal would not have been counted as reserves . . . because it was too deeply buried to strip mine it and too shallow to mine by underground methods. . . .

"One area of rapid recent technological advance is strip mining, in which productivity per man-day currently averages about 22 tons versus 9 tons in underground mining. . . . The recent development of supergiant shovels, together with such refinements as the bucket-wheel excavator [are such that] some observers voice concern over the adequacy of 'strippable reserves.'

"But the new technology itself demonstrates how open ended these 'reserves' are. Current equipment can handle overburden up to 120 feet in thickness. Only a few years ago 80 feet was the maximum.

"BUT THE GREATEST PROSPECTS lie underground. Here a true technological revolution is under way in the form of a continuous mining machine. Introduced around 1950, the continuous miner now accounts for approximately 20 per cent of total underground production . . . The reduction in manpower . . . and the consequent rise in productivity of the manpower retained, has been dramatic. . . ."

It is not in modes of extraction alone that recent technological changes may conceivably put coal back into the running as a competitor to the other fossil fuels, liquid and gaseous; for now, by locating power plants close to the mouths of mines coal may be "sent by wire," Netschert indicated. Besides:

"There looms on the horizon the threat of unconventional transport means. The successful operation of the first commercial coal pipeline . . . has generated interest in projects of this kind; and the long-distance conveyer belt for coal remains a practical possibility."

THE HISTORICAL RECORD, Sam H. Schurr pointed out, brings out the flexibility of the energy resources base of the United States in meeting the country's needs for fuel and power during a period of rapid growth and economic transformation.

From statistics going back to 1850, it can be seen that coal was first among energy sources in the United States for only a relatively short period—at least compared with other industrial countries. "Coal contributed more than 50 per cent of the total annual energy supply for about half a century, roughly from 1885 to 1940. It is interesting, too, in this longer perspective to observe that the rise of liquid and gaseous fuels and the displacement of coal roughly parallel the rise of coal and the decline of wood in the over-all energy supply half a century earlier. . . . Between 1850 and 1895, coal increased from 9 to 65 per cent; wood declined from 91 to 30 per cent. Between 1910 and 1955, oil and gas increased from 9 to 65 per cent; coal declined from 77 to 29 per cent. Thus within the past century the composition of the U. S. fuel and power base changed twice so markedly that the relative importance of the principal energy sources was completely reversed.

In discussing total energy consumption, Schurr compared its historical growth with that of GNP to see whether the relationship between energy consumption and the nation's total output of goods and services has been steady. This comparison indicated that although the historical behavior of energy consumption per unit of GNP is marked by great diversity, it also reveals "what appears to be a definite pattern, consisting of two long-period swings divided by the 1910-20 decade. . . . The record between 1880 and 1910 is one of persistent increases in the input of energy per unit of GNP; between 1920 and 1955 the record tends to be one of persistent decline in the ratio of energy to GNP."

The remarks of Mr. Schurr and Mr. Netschert were in some part advance excerpts from a book lately completed by several members of the Energy and Minerals research group, headed by Mr. Schurr. The work, entitled "Energy in the American Economy: 1850-1975," will be published by The Johns Hopkins Press late this year. The full statements the two staff members made before the Subcommittee were recently reprinted by RFF as "Reprint Number 14."

COAL-DUST PIPELINE

HERE AND ABROAD, there has been talk of such a conduit for more than a decade, and a few short pilot models were put to trial; but the 108-mile-long, 10-inch tube which now connects the strip mines around Cadiz, Ohio, with the great lakeshore power plant at Eastlake, on the outskirts of Cleveland, is the first of its kind actually to be put to work.

Completed in 1947 at a cost of $10 million, this installation, above ground and below, is not greatly different from pipelines transporting oil and gas, coal's chief competitors among the fossil fuels. Underground, the main difference lies in pipes so constructed as to resist abrasion from the "slurry"—powdered coal suspended in water—with a cutting power on metal comparable to that of emery-cloth.

Three pumping stations lift the slurry upgrade and across the rolling farmland of northeastern Ohio. Delivery from strip mine to power plant takes a day and a half, at a cost conservatively reckoned to be less than half that of transport by truck or railroad "gondola."

At the delivery end of the line the coal dust is dewatered and blown into the furnaces. The principal railroads thus undercut—the Pennsylvania, New York Central, and Nickel Plate—having watched this development closely—appear to have acted according to the adage: "If you can't lick 'em, jine 'em," by acquiring sizable stockholdings in this new line. If, as seems likely, more such lines are laid, they could cut a real figure in the competitive conflict between coal, oil and gas, and between traffic by rail, truck and barge as well.

CONTEMPORARY WATER MYTHS

I DIRECT THESE informal remarks to two popular myths, closely interrelated here in the Potomac River Basin. First is the myth that there is or soon may be a serious shortage of water in the eastern United States. We have hardly begun to tap the vast potentialities of water resources in the humid East. Development will be necessary. But the water is available.

Second is the myth that water management problems are primarily engineering problems. Although engineering has an indispensable role, its problems are of considerably lesser magnitude than others which require resolution... Engineering difficulties are subordinate, for example, to other issues in the controversy over River Bend Dam, hydro-power installations on the Potomac, the inundation of farm land in the Shenandoah Valley. . . .

Pollution is indeed a serious problem in this Basin. But is this because sanitary engineers have been unable to devise practical ways of abatement? Or, rather, because of difficulties in reaching agreement on how much abatement is justified, and in getting the political jurisdictions to agree on objectives and a coordinated program? . . .

Water development is part of the total physical and economic environment of a region. It deals in many ways with values not susceptible of measurement through the conventional benefit-cost analysis. . . .

Thus, in final analysis, the development of the Potomac is, and by right should be, a political problem. May I express the hope that the government agencies under the leadership of the Corps of Engineers will recognize that they are not qualified to decide what is the best plan? I believe that several alternative plans, each evaluated as objectively as possible, should be presented for public determination through the political process.—*Irving K. Fox, in a talk at the Washington Sanitation Conference.*

Passages

LET US LOOK 1,000 YEARS into the future, rather than just 100 years. At that date no one would say that we can depend heavily upon coal and petroleum for the energy base of our world economy. Unless "breeding" of nuclear materials becomes economic, we would also probably be running out of economic ores of uranium and thorium, regardless of any practical exploration efforts. This is the future period for which concern with running out of minerals becomes very serious.

This is the "conservation nightmare"—that our civilization would follow that of the Mayas into oblivion, having depleted its basic natural resources that are within the scope of its technical knowledge. There is, however, one very important alternative: . . . an ecological balance. This is a practical solution, not just an act of faith.

The ecological balance means that solar energy capture could be made adequate for a permanent supply of energy of a world population several times the present at a per capita income level several times that of the United States today. Based upon present basic technology and very heavy investment, most agricultural land would be devoted to fuel plant production and much additional nonagricultural space to solar cells of various sorts.—*Paul W. McGann*

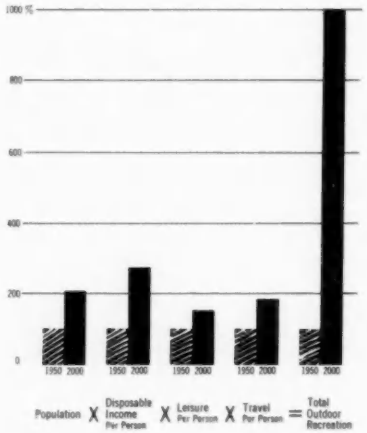
WHY THEY BEHAVE LIKE FORESTERS . . . The realization that successful organizations manipulate the intellects and wills of their members, as Forest Service experience illustrates, has recently produced a flurry of alarm . . . To some observers, this seems to be a threat to the freedom and dignity of man . . .

These fears are not entirely without foundation, but they are based on a partial view of reality . . . That which is called control of the mind is, when viewed from another standpoint, also termed morality. Conscience, principles, patriotism, honor, devotion to duty and to one's comrades, unswerving justice, compassion, resistance to temptation, refusal to submit to attempted intimidation, self-control, and many other much-admired qualities, are evidences of values, attitudes, and beliefs so deeply ingrained that self-interest, personal desires . . . are rendered nugatory as influences on behavior.

The same applies to the zeal, conscientiousness, and integrity of the men in the Forest Service; these traits are so thoroughly infused into them that the Service has never been touched by so much as a breath of scandal, although it is the custodian of properties worth hundreds of millions of dollars, has handled many hundreds of millions in receipts and expenditures, and is responsible for a program that was beset by fraud and dishonesty for much of the last third of the nineteenth century.—*Herbert Kaufman*

The Passage at the left is excerpted from SCIENCE AND RESOURCES, essays deriving from RFF's 1959 Forum. The one above is from THE FOREST RANGER: A Study in Administrative Behavior. Both books were published for RFF by The Johns Hopkins Press.

THIS IS THE OUTLOOK for recreational land use by the year 2000 compared with that of 1950, according to an analysis made by Marion Clawson in a study of land use to be published later this year for RFF by The Johns Hopkins Press.



Four interrelated factors contribute to this possibility: a roughly doubled population; doubled average income after taxes; greater leisure derived from a shorter work week and longer vacations; and greater mobility amounting to nearly twice the 5,000 miles a year the average American travels today. If these four factors are multiplicative, and if prospects for the future bear any resemblance to past trends, the effect would be about a tenfold increase by 2000.

These are the dimensions of the "crisis in recreation"—some of the reasons why the Congress in 1958 set up the Outdoor Recreation Resources Review Commission to take a long look at the resources we shall need to supply our snowballing demands.

RESOURCES FOR THE FUTURE, INC. is a nonprofit corporation established in 1952 to advance the development, conservation, and use of natural resources through research and education. Its work is financed by grants from The Ford Foundation.

RESOURCES FOR THE FUTURE, INC.
1145 Nineteenth Street, N.W.,
Washington 6, D. C.